

[0076] The intermediate product **86** shown in FIG. **17** differs from that of FIG. **16** in that filling material **82** is formed by a resin that covers at least the top surface **88** of plate **14**, i.e. the surface on the side of which resin **82** was introduced. In the example of FIG. **17**, resin **82** also covers bottom surface **89** of plate **14** and module **2**, in particular, substrate **12**. In another variant, plate **14** and the electronic modules are placed on a work surface or a worksheet as in the case of FIG. **16**, and the resin is only introduced slowly, from above, into the space remaining in apertures **16**. In such case, only top surface **88** of plate **14** and the top surface of display **6** will be covered. If electronic display **6** is covered by resin **82**, this resin **82** will obviously be sufficiently transparent to allow the display to be read. As in the example of FIG. **16**, electronic circuit **4** is covered by resin **82**.

[0077] Once the resin has been added and distributed in apertures **16**, a step is provided for solidifying the resin to form the intermediate product. In the example of FIG. **17**, the assembly according to the invention is embedded in resin **82**. However, in the example of FIG. **16**, resin **82** does not define a through layer, but it is localised essentially in apertures **16** of plate **14**. In FIGS. **16** and **17**, the top surface of the solidified resin is slightly rippled, i.e. it has slight variations in thickness. This does not mean that the resin was only added by a casting technique, but it can indicate that, when the resin or filling material solidified, the material may have shrunk in a non-homogenous manner, given the presence of relatively bulky electronic elements, formed of various materials. Thus, the non-flat surface of intermediate product **86** can also result from a method wherein the resin is spread using a roller or blade, and even in the case where the resin is injected or spread in a press with flat surfaces. The intermediate product **86** can already be used to form a card or electronic token once it has been cut out, but its surface state can be improved within the scope of a method according to the invention, which will be described below.

[0078] FIG. **18** shows an alternative embodiment of the intermediate product. This variant is characterized in that two worksheets are also provided on either side of the assembly according to the invention, i.e. covering the top and bottom surfaces of the resin layer. These worksheets **104** and **106** thus have poor adherence to resin **82** and facilitate the manufacture of the intermediate product. In fact, the resin is not then placed in contact with the surfaces of the manufacturing installation for the intermediate products according to the invention. The worksheets are removed once the resin has solidified. In another variant, a thin plastic film is provided on each side of the resin, which adheres securely to the resin. This film remains in the cards manufactured in accordance with the method described below.

[0079] With reference to FIG. **19**, we will describe below a method of manufacturing at least one card according to the invention. The steps in this method include:

[0080] making an intermediate product according to the invention, for example intermediate product **80** of FIG. **16**, or intermediate product **86** of FIG. **17**;

[0081] depositing a resin over at least one of the top and bottom surfaces of the intermediate product;

[0082] applying pressure on the resin deposited on the intermediate product to spread the resin out and make said bottom and/or said top surface of the intermediate product level, said resin then being in a non-solid state and preferably viscous liquid, to compensate for any variations in thickness in the intermediate product.

[0083] FIG. **19** shows a plurality of cards that are batch manufactured in accordance with the method described below. After intermediate product **86** was made, two resin layers **92** have been added on either side of intermediate product **86**, in addition to two external solid layers **94** and **96**. Using a press, pressure is applied against external layers **94** and **96** so as to form a plurality of cards **90**. The references that have already been cited will not be described again here in detail. If the intermediate product includes two external plastic films, the resin is then deposited above and the films are covered with resin on both sides.

[0084] It will be noted that there are various possible variants as regards the addition of resin **92** on either side of intermediate product **86**. A first main variant consists in adding the resin in a viscous liquid state, either before or simultaneously with the addition of external layers **94**, **96**. The card according to the invention can be formed for example in a press with flat surfaces in which the various elements are placed, or using press rollers known to those skilled in the art. Resin **92** can be identical to the filling material or resin **82**, used to form the intermediate product. However, a different resin that is suited to application in thin layers could very well be selected for layers **92**. Moreover, a resin **92** that is particularly stable and has no significant shrink during solidification, will preferably be selected.

[0085] As is clear from FIG. **19**, intermediate product **86** has a slightly rippled top surface. Resin **92** is distributed when pressure is applied so as to fill in the ripples in the intermediate product, to form a card, or a plurality of cards **90**, whose external layers **94** and **96** have a perfectly flat surface. Manufacturing by adding the resin or filling material in two steps results in cards that have a given thickness and thus overcomes the flatness problems encountered in the manufacture of cards that have relatively large electronic modules or elements inside, in particular electronic elements whose thickness is variable, which cause variable resin thickness inside the card. The resin can be added to the intermediate product and pressure can be applied above in several successive steps. Thus, during the first application of resin, two worksheets are preferably used, and then removed once resin layers **92** have solidified. A second resin layer can then be added above to further improve the flatness of the card. As already mentioned, a multi-layered structure with thin plastic films between two depositions of thin resin layers, could also be provided.

[0086] According to a second main variant, the resin layers **92** are added in the form of solid resin sheets, which are then at least partially melted prior to or simultaneously with the application of pressure to form the finished cards. The resin sheets are thus sufficiently soft and easily deformed for the resin to be able to spread and fill the surface unevenness of the intermediate product **86**, in order to form a high quality flat card. Heat can be applied by various means and, in particular, via the actual press. Finally, resin **92** can also be solidified in various ways, depending upon the features of the resin. The resin can solidify at ambient temperature, or by other means known to those skilled in the art, particularly by a chemical reaction or polymerisation with thermosetting materials.

[0087] It will be noted that the finished card **90** can include several external layers and transparent protective layers, for example, to protect any printing performed on layer **94** or **96**. Generally, any intermediate product and any card obtained within the scope of the present invention, can then be laminated with a variable number of plastic layers, without using